



Ø BEAT



COLO. SPRINGS,
COLORADO

SEPTEMBER 1982

RFI Got You Down? The Cure Is At The September Meeting

RFI SEMINAR TO BE HELD

A Radio Frequency Interference Seminar will be held at the September Meeting of the PPRAA. The program will be presented by William Nelson, president of Nelson Consulting, Inc., an RFI investigation and training firm. Mr. Nelson has over thirty years of professional experience in RFI which includes sixteen years of Interference troubleshooting as Amateur Radio Representative for Southern California Edison. Mr. Nelson is also the author of the "Radio Frequency Interference Handbook" which is nationally accepted as the standard for RFI investigating.

The seminar will be sponsored by the Colorado Springs Department of Public Utilities and hosted by the Pikes Peak Radio Amateur Association. It is designed to encourage cooperation between the Utility Department and Hams, Short Wave Listeners, and CB operators.

Power line interference on radio receivers is usually caused by high energy leaks in the power transmission system (telephone poles, transformers, etc.). These leaks result in costly power losses which eventually must find their way to our utility bills. The seminar will focus on methods of detecting and locating power line interference to assist in eliminating power leaks in the area. The results will not only benefit us as users of the radio spectrum but will potentially lessen the monthly shock when we open the bill for running our equipment.

Mr. Nelson's program is a high caliber multi-media presentation which will follow the agenda below:

1. Introduction to RFI
2. Identification of Sources of RFI
3. Why the utilities are blamed for RFI
4. Cost factors of the location of RFI
5. The costs of correction
6. Techniques of locating RFI

7. Construction Practices

8. Discussion

The program promises to be interesting and informative. There is no cost to attend and all persons interested in the subject are invited. The program will begin at 7:30 p.m. in the basement of the First Methodist Church at 420 N. Nevada, Colorado Springs.

CLUB PICNIC MAP

The site can be reached a couple of ways. Either go out T-Gap to Black Forest Road and then north to Shoup Road, and then west to the Black Forest Rec Area. Take the entrance road north and you will come to the parking lot and pavillion. The other way is north on Academy Blvd. to Hwy. 83, then north to Shoup Road and east to the site. It's a snap!



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(*Two-year board terms began October 1981)

ZERO BEAT is published monthly in the interest of the members of the Pikes Peak Radio Amateur Association, Inc., Colorado Springs, Colorado. Permission is given to reprint articles or excerpts provided credit is given. Deadline for submission of articles is the 21st of the month. Classifieds accepted anytime.

The Pikes Peak Radio Amateur Association meets on the second Wednesday of every month at the First United Methodist Church, 420 N. Nevada, at 7:30 p.m. All amateurs and interested parties are invited to attend.

Editor: Don Lohse KBØKQ, 1410 E. LaSalle, Colorado Springs, CO 80907 635-7469

MEETING MINUTES

The August meeting of the Pikes Peak Radio Amateur Association was called to order at 7:37 p.m. August 11 by President Al Bailey, ADØZ. After introductions of members and guests, the meeting minutes for July were moved to be accepted, seconded and passed.

Committee reports followed with Treasurer Doug, WBØMHP reporting \$2432 with \$627 earmarked for a club portable generator and \$350 stashed for next year's Swapfest prizes. The RFI committee continued to see light duty with two cases of TVI reported.

Several announcements were made of upcoming events. There will be a hidden transmitter hunt in the near future — tune up your DF equipment or just come along to join in the fun. The club picnic will be held Sept. 26 at Black Forest Pavilion I. The club will furnish beer, pop, potato chips and charcoal for the grill. Bring your family and enjoy. (Bring a hamburger and potato salad, too.)

The October meeting will be election night. There will be jobs available for anyone who would like to participate in guiding this club. Don't let the evening slip by — your inputs could be the most valuable this club will receive. Let the nominating committee (i.e.—a current board member) know of your interest.

Bob, KØDJ, reported on his attendance at the ARRL convention held in Yellowstone for the Rocky Mountain and Northwest divisions. Vic Clarke of ARRL gave information at the convention on stable ARRL rates for the coming year, a third party agreement with Australia, and a proposal for 75 M phone expansion.

After a short break and viewing of a videotape (from Charlie Biggs) on Field Day and Swapfest, a program was presented by Ed Means, WØVO, of AMSAT on satellites and satellite communications. The upcoming AMSAT program could be a major revolution for the future of Amateur Radio.

Next month's meeting will be on RFI and power line interference to be presented by Mr. William Nelson, a

leading troubleshooter and authority for power companies in this field. Be sure to attend for what should be an enlightening and interesting program.

The meeting adjourned at 10:00 p.m.

Respectfully submitted,
Greg, KAØFOZ

UPCOMING SWAPFESTS

Boulder BARCFEST on

Sunday September 26th-9 a.m.-3 p.m.

Grand Prize \$300 CW Electronics Gift Certificate

Aurora Repeater Association Swapfest

Sunday September 12th, starting at 9:00 a.m.

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COMPUTERS PART II

If you accept the definition that a computer is a mechanical, electromechanical or electronic device that can input, store, process and output data you will also have to accept that computer technology is thousands of years old. One of the oldest known computing devices is the Chinese abacus (invented circa 2000 BC). The abacus, when skillfully manipulated by its operator can add, subtract, multiply and divide. Although rudimentary in nature, the abacus was so fundamental to the development of computer technology that it is still in use today.

Contributing to the long dry spell that followed the invention of the abacus was the fact that Western Civilization had to put up with a very cumbersome numbering system devised by the early Romans. Now known as the Roman Numeral System it was the first step toward the Arabic (decimal) numbering system in use today. The Roman system had character designations for exponential powers of ten. Because the resultant number groupings were so wide, they devised character designators for half of each base ten grouping. The table below should help clear this up:

$M=10^6=1,000,000$	$M=10^3=1,000$	$C=10^2=100$
$X=10^1=10$	$I=10^0=1$	
$D=5 \times 10^5=500,000$	$D=5 \times 10^2=500$	
$L=5 \times 10^1=50$	$V=5 \times 10^0=5$	

As if this wasn't complicated enough, we had to pay particular attention to the order of these character designators. To determine the value of a Roman numeral we start at the right hand side of the number and start adding to the left. But we can only continue to do this if the designator on the left is equal to or larger than the one we just added. If it is smaller we must subtract instead.

For example:

$II=1+1=2$ [Remember—work from right to left]
 $IV=5-1=4$
 1st character on left is smaller—so subtract
 $MCMLXXXII=1+1+10+10+10+50+1000-100+1000=1982$
 Don't forget to subtract.

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That sure was the long way around to write a number. Think of trying to make your computer do that conversion every time you input a number. Multiplication and division quickly become ridiculous.

Fortunately, the decimal based Arabic system came into being about the fifth century. For some reason, the Zero or placeholder was not developed for another four to five hundred years. By the thirteenth century, however, the decimal system as we know and use today was in widespread use.

Today the decimal (base 10) system is the standard numbering system in virtually every corner of the world. It is interesting to note, however, that although it was this system that enabled mathematicians and scientists to launch the computer age, few modern computers use the base 10 as their internal machine language. The most common numbering systems used are base 2 (binary), base 8 (octal) and base 16 (hexadecimal).

It was finally in the seventeenth century that things started to cook in the world of computers. First, a scientist named Blaise Pascal helped increase our understanding of carry and borrow operators with the invention of "Pascal's Machine Arithmetique." It was a crude adding machine that was made up of notched wheels interconnected by gears. Each wheel had ten notches, and after every complete revolution of a lower wheel the next higher wheel would move ahead one notch. (Now you know who invented the odometer). Multiplication consisted of nothing more than repeated additions, and division of nothing more than repeated subtractions.

A second scientist named Gottfried Von Leibnitz improved on Pascal's idea by developing a way to do multiplication directly. The principle of his machine, called a Stepped Reckoner, was used in many electromechanical calculators through the late 1960's.

Computers (cont.)

Of course, both Pascal's and Leibnitz's machines had to be manually operated; someone had to feed in the numbers and turn the crank for each operation.

Ending another dormant period of 200 years, Charles Babbage is credited with conceiving the first fully automatic calculating machine. The word "conceiving" is correct because metal working technology in the early 1800's had not progressed enough to enable him to build his machine. The design for what he called the Analytical Engine had to sit patiently for many years until a working model was actually constructed.

The next major milestone in the development of computers was the invention of the vacuum tube. Simultaneous with research in the area of communications, experimentation was begun to replace the mechanically operated gears and wheels with electrical signals. Development was done on both analog and digital computers. In the early states of the art of electronic technology, analogy designs were more easily understood and definable than were digital designs. Analog is a directly measurable entity which can be voltage levels, shaft positions or number of rotations. Digital signals on the other hand are not read directly. They must be encoded and decoded. In other words, they must be changed from our language to machine language and back. Consequently, analog designs were far more prevalent in the early years than digital.

As much as necessity is the mother of invention, war is the mother of necessity. World War II did much to accelerate computer development. Analog computer designs of all sorts were produced at a frenzied pace. Analog computers took such a firm foothold in that stage of technology that it took years before digital

concepts were able to attain their rightful place in the world. None the less, it was inevitable. Analog computers just couldn't maintain the accuracy and consistency that digital computers could. Finally, in 1958, the last large scale fully analog bombing and navigational computer system was installed in the last B-52 Stratofortress. Since that time, the Air Force has been consciously attempting to incorporate digital computers and signal processors into aircraft systems whenever and wherever possible.

The development of digital computers made steady progress during World War II. The biggest problem with digital concepts was that their massive size, weight and power consumption made them immobile. Near the end of the war, the University of Pennsylvania, finished constructing ENIAC, the world's first large scale digital computer. ENIAC contained 18,000 vacuum tubes, weighed more than 30 tons and consumed 130,000 watts of power. With a clock rate of 5 KHz, its access time was an incredibly slow 200 micro-seconds. Today, the Radio Shack vest pocket has more computing power than ENIAC did.

In the early 1950's, the use of the newly discovered transistor reduced the size and power requirements of the computer. It was the invention of the transistor that really put computers into widespread use. Even then, however, they were very expensive and only affordable by large companies.

Two companies were simultaneously developing a technique that was destined to alter the course of the world. Texas Instruments was the first of the two to market a product using this technique. The product was renamed from "Flying Wires" as its creator called it to "Monolithic Integrated Circuit". TI tried, to establish first inventor's patent rights, but the second company, Fairchild Semiconductor, took the case to court. They established that although TI was first to market a product using the IC concept, Fairchild was also experimenting with the idea just as long. Fairchild won. Integrated circuit technology was now available for Fairchild or anyone else to exploit pretty much as they pleased.

Computer technology shifted into high gear. Throughout the 1960's companies began making register oriented integrated circuits that were used to make calculators. The types and sizes of digital IC's rapidly proliferated. IC design became increasingly complex.

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Wilson WE 224 2 meter mobile. CAP call w/Heath TTM \$125.
Heath HW 202 \$75.
Heath HW 2036 synthesized 2 meter—nice \$150.
Icom 22A \$100.
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Santec 1200 2 meter HT—synthesized \$199.
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BOARD MINUTES

The meeting of the Pikes Peak Radio Amateur Association Board of Directors was called to order at 7:50 p.m. August 16 at the home of Karl, K4DQ. Present were Les, WDØGTA; Karl, K4DQ; Doug, WBØMHP; Al, ADØZ; Mark, KAØJXW; and Tom, ADØO.

Possible nominees for the October elections were discussed. The persons will be contacted in the next few weeks concerning the possibility of running for office. Persons interested in office should also make their interest known.

Al reported on the status of caps and jackets. Three caps are presently ready. More items may be ordered by contacting Al.

The Board resolved to have the secretary draft a letter to clubs in the area and on the mailing list inviting them to the September 8th meeting. That meeting will feature Bill Nelson, WA6FQC, author of the Interference Handbook. Mark moved, Doug seconded, to authorize the printing of 100 extra copies of Zero Beat for September only. The motion passed unanimously.

The picnic plans are advancing. The date is September 5th at Black Forest Pavillion One. Members may sign up the September meeting or may contact a Board member.

Mark reported that commander Casey at the Naval Reserve Center is interested in discussing the possible location of the club station. A proposal will be worked out and discussion will begin shortly.

There being no other business before the Board, the meeting was adjourned at 9:30 p.m. The next meeting will be at Mark's on September 13th.

Respectfully Submitted,
Mark Richardson, KAØJXW

THE WAY IT WAS

From the WIRELESS AGE, October 1913 issue, "A wireless station, to be one of the links of a chain of such stations which will connect the Atlantic and Pacific coasts, may be established on the summit of Pikes Peak as the result of a trip made by Franklin K. Lane of the Department of the Interior, who was the guest of the management of the Cog road.

"Its purpose was to determine whether the summit of Pikes Peak would be a fit place on which to build a powerful wireless station which will connect the two oceans and be used solely by the U.S. Government. As a result of Secretary Lane's visit the Weather Bureau which was maintained by the government for so many years at the Summit House may be re-established."

Possibly some of the old timers could let you know if this station was ever placed in operation.

By the way, this copy of WIRELESS AGE sold for only 15 cents.

Karl White, K4DQ

Computers (cont.)

It became necessary to categorize IC's into the size groupings shown below to properly identify them:

	Gates Per Chip
Small Scale Integration (SSI)	3—30
Medium Scale Integration (MSI)	30—300
Large Scale Integration (LSI)	300—3,000
Very Large Scale Integration (VLSI)	3,000—30,000

AI ADØZ

(Next month — some of the inner workings of the computer)

MEETING NOTICE

The September meeting of the Pikes Peak Radio Amateur Association will be held on September 8 at 7 p.m. at the First United Methodist Church located at the corner of Nevada and Boulder streets. The program will be given by Mr. William Nelson, author of the RFI Handbook, and a recognized expert in that area, and will deal with power lines and their relation to radio interference problems. The program will begin promptly at 7:30 p.m. Members and interested persons are invited to attend.



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